LAWRENCE
LIVERMORE
NATIONAL
LABORATORY

UCRL-CONF-206697

San Francisco Estuary Striped Bass Migration History Determined by Electron-microprobe Analysis of Otolith Sr/Ca Ratio

D. J. Ostrach, C. C. Phillis, P. K. Weber, B. L. Ingram, J. G. Zinkl

September 21, 2004

Fourth SETAC World Congress
Portland, OR, United States
November 4, 2004 through November 8, 2004

San Francisco Estuary Striped Bass Migration History Determined by Electron-microprobe Analysis of Otolith Sr/Ca Ratio.

Ostrach, David J.(1), C.C. Phillis (2), P.K. Weber(3), B.L. Ingram (2), J.G. Zinkl (1)

Authors affiliations:
(1)Department of Pathology, Microbiology & Immunology, School of Veterinary Medicine, University of California at Davis, Davis, CA 95616
(2)Department of Earth and Planetary Science, University of California, Berkeley, 307 McCone Hall, Berkeley, CA 94720-4767
(3)Chemical Biology and Nuclear Science, Lawrence Livermore Laboratory, L-231, P.O. Box 808, Livermore, CA 94551-0808

[PW1]Habitat use has been shown to be an important factor in the bioaccumulation of contaminants in striped bass. This study examines migration in striped bass as part of a larger study investigating bioaccumulation and maternal transfer of xenobiotics to progeny in the San Francisco Estuary system. Habitat use, residence time and spawning migration over the life of females (n = 23) was studied. Female striped bass were collected between Knights Landing and Colusa on the Sacramento River during the spawning runs of 1999 and 2001. Otoliths were removed, processed and aged via otolith microstructure. Subsequently, otoliths were analyzed for strontium/calcium (Sr/Ca) ratio using an electron-microprobe to measure salinity exposure and to distinguish freshwater, estuary, and marine habitat use. Salinity exposure during the last year before capture was examined more closely for comparison of habitat use by the maternal parent to contaminant burden transferred to progeny. Results were selectively confirmed by ion microprobe analyses for habitat use. The Sr/Ca data demonstrate a wide range of migratory patterns. Age of initial ocean entry differs among individuals before returning to freshwater, presumably to spawn. Some fish reside in freshwater year-round, while others return to more saline habitats and make periodic migrations to freshwater. Frequency of habitat shifts and residence times differs among fish, as well as over the lifetime of individual fish. While at least one fish spent its final year in freshwater, the majority of spawning fish spent their final year in

elevated salinity. However, not all fish migrated to freshwater to spawn in the previous year. Results from this investigation concerning migration history in striped bass can be combined with contaminant and histological developmental analyses to better understand the bioaccumulation of contaminants and the subsequent effects they and habitat use have on fish populations in the San Francisco Estuary system.

Keywords: otolith sr/ca; striped bass migration; electron-microprobe; habitat use
Submission preference: Poster
Session selection: C10 Migrations: Role of Biota in Contaminant Distribution.
Abstract body = 299 words

This work was performed under the auspices of the U.S. Department of Energy by the University of California, Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.